REMARKS/ARGUMENTS

Favorable consideration of the present application and the above claims is respectfully requested.

Claims 1 – 22 were pending prior to this amendment.

Claims 5, 7, 9, 15-17 are canceled since they are incorporated into the relevant independent claims. The claims now pending are 1-4, 6, 8, 10-14, 18-22.

Independent claims 1, 2, 3, 4, 10 and 18 are amended to claim Applicant's invention as a 3-bit, 0-1-2 ternary encoding scheme for WORM (Write Once Read Many Times) optical data storage on a compact disc (CD) or digital video disc (DVD) based on two-photon induced recording and two-photon fluorescence readout technology. Support for the amendments to the preamble of Claims 1, 2, 3, 4 10 and 18 is found in the specification on page 3, lines 12-13; page 5, lines 12-31, and lines 29-30.

Other amendments to the claims include identification of a transparent polymer used in the data storage medium. Support for the amendment is found in the specification on page 7, line 12 and original claim 6.

Amendments identifying use of "Ti:Sapphire laser beam" and "730nm wavelength of laser light" to store data and identification of the reactive dye as a "fluorene" dye are supported in the specification on page 4, lines 17-18, page 7, lines 13-14, Figure 3 and original claims 7, 9 16 and 17.

Amendments describing the data storage medium as containing a "photo-acid generator (PAG)," a reactive "fluorene" dye (RD) and a "protonated fluorene dye as the fluorescence emitter (FE)" are supported by the specification at page 8, lines 10-25; page 12,

lines 3-23. Amendments describing encoding data "in a 0-1-2 ternary (3-bit) data encoding scheme to achieve high data storage densities in" the data storage medium is supported by the specification on page 5, lines 12-13 and page 9, lines 1-4.

Amendments to claim the fluorescence of RD and FE caused by two-photon infrared laser light pulse of 10 micro seconds and 800 nm wavelength laser light for data readout are supported by the specification at pages 4, line 20, page 8, lines 20-26 and original claims 5, 7 and 15.

Amendments to the claims identifying measurement of output signals lasting 5 nanoseconds at 650 nm wavelength for FE and 530nm for RD are supported by the specification at page 4, line 21, the paragraph bridging pages 8 and 9 and Figure 6.

Amendments to claims stating that three pieces (ternary) rather than 2 pieces (binary) of information from each bit gives approximately 50% more data storage from the same number of bits over a binary system are supported by the specification at page 9, lines 1 – 4.

No new matter is added by the amendments identified above.

Editorial amendments to claims include the following: (H$^+$) is added to enhance readability and understanding of what is meant by "a proton ion." In claim 10, step (c) is incorporated into step (b) so the list of steps in claim 10 is revised accordingly. Dependent claims 11 – 14 are amended to begin with the indefinite article "The" since they are dependent on Claim 10 which claims "A multilayer data storage system…" Likewise, claims 19 – 22 are amended to begin with a phrase starting with an indefinite article "The 3-bit, 0-1-2- …" since they are dependent on Claim 18 which claims, "A 3-bit, 0-1-2…" This is standard practice and terminology used in claim drafting. No new matter is added by the foregoing editorial amendments.

Applicant now responds to the detailed action starting with a statement of Applicants' invention, as now claimed: Applicant's invention increases the data storage capacity in a data storage medium (CD or DVD), by at least 50%, using a 3-bit, 0-1-2 ternary encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating fluorescent values in a transparent polymer impregnated with a reactive dye (fluorophore) and a photo-acid generator. Prior to Applicant's invention, it was not known that a chemical process would yield image formation within a photosensitive polymeric film containing a photo-acid generator and an acid-sensitive fluorophore, which allows two-photon induced fluorescent imaging and readout.

On page 2, paragraph 1 of the Office Action of July 09, 2008, the Examiner discusses the effective date of a reference cited against applicant's invention (Fleming et al. WO 01/96959) and reaches a conclusion that "... the date accorded Fleming et al. ... under 102(e) is 6/14/2001." Applicant does not agree with the examiner on this point; however, the arguments that follow will show that the Fleming et al. reference does not teach, suggest, or motivate one skilled in the art to practice Applicant's invention which is directed to a 3-bit ternary encoding scheme for WORM in applications such as compact discs (CDs) and digital video discs (DVDs). Thus, Applicant will not pursue the documentation of laboratory work to determine the earliest reduction to practice because the inventions are, in Applicant's opinion, patentably distinct.

Paragraphs 2 and 3 of the Office Action of July 09, 2008 are related to the rejection of Claims 1, 3 and 18-19 under 35 U.S.C. 102 (e) as being fully anticipated by Devoe et al. WO 01/96952.

The Examiner argues that, "Devoe et al. WO 01/96952 teaches two photon imaging as means for controlling the area of exposure … in three dimensions and the ability to write features below the diffraction limit. The use of a ti:sapphire laser… sensitizers…dye precursor…binders… fluorene sensitizers… fluorescence of the photosensitizers…" are disclosed.

The Examiner has used *prohibited hindsignt*, to selectively find every element of Applicant's invention and reject Applicant's invention as completely anticipated by Devoe et al.

Applicant's claims are now amended to more precisely claim the invention. Applicant does not form colored patterns or images; in contrast, Applicant's invention increases the data storage capacity in a data storage medium (CD or DVD), by at least 50%, using a 3-bit, 0-1-2 ternary encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating fluorescent values in a transparent polymer impregnated with a reactive dye (fluorophore) and a photo-acid generator.

In contrast, Devoe et al. teaches a two-photon process that includes dyes and dye precursors and photoacid generator to form a multicolor image in a printing process; there is no suggestion of a process for increasing data storage capacity on a CD or DVD; nor is there any disclosure regarding image writing and reading using a 3-bit, 0-1-2 ternary encoding scheme.

In *Penn Yan Boats, Inc. v. Seal Lark Boats, Inc.,* (DC SFla) 174, USPQ, 260 (1972), the court held that "Anticipation can exist only where a single prior art reference teaches the same elements as claimed, united in the same way to perform an identical function." It is

clear that Devoe et al. teach and claim multicolor imaging – not multilayer data storage and readout on CDs and DVDs, as does Applicant.

In *In re Carleton*, 202 USPQ 170 (CCPA, 1979) the court stated, "Although there is a vast amount of knowledge about general relationships in the chemical arts, chemistry is still largely empirical, and there is often great difficulty in predicting precisely how a given compound will behave." Further, the court quotes from *Schering Corp. v. Gilbert*, 153 F. 2nd 428, 433, 68 USPQ 84, 89 (2d Cir., 1946),"…while analogy is at times useful, … chemistry is essentially an experimental science and results are often uncertain, unpredictable and unexpected."

Applicant respectfully requests the withdrawal of the rejection of Claims 1, 3 and 18-19 under 35 U.S.C. 102 (e) as being fully anticipated by Devoe et al. WO 01/96952 in view of Applicant's amendments to claims and the fact that the photoacid generator, ti:sapphire pulsed laser, dyes and dye precursors of Devoe et al. DO NOT perform the same function as the ti:sapphire laser, photoacid generator, fluorene dye, transparent data storage medium disclosed by Applicant.

Paragraph 4 of the Office Action of July 09, 2008 rejects claims 1, 3 and 18 and 19 under 35 U.S.C. 103(a) as being unpatentable over Fleming et al. WO 01/96959.

The Examiner argues that "Fleming et al. teaches … a photosensitive composition … (a photo-acid generator) and … (a two photon dye) coated to a thickness of 60 microns written upon using a Ti:sapphire operating at 800 nm…" The use of fluorene dyes is disclosed on page 28."

Applicant's claims are now amended to more precisely claim the invention. Applicant does not form colored patterns or images or holograms; in contrast, Applicant's

invention increases the data storage capacity in a data storage medium (CD or DVD), by at

least 50%, using a 3-bit, 0-1-2 ternary encoding scheme rather than a 2-bit, 0-1 binary

encoding scheme, wherein both image writing and reading are accomplished via near-IR

two-photon excitation creating fluorescent values in a transparent polymer impregnated with

a reactive dye (fluorophore) and a photo-acid generator.

Applicant does not use light in writing to change optical properties of the storage

medium, whereas, light is used in Fleming et al. to change the optical properties of a storage

medium to create a holographic image which is in a 2-bit data storage format. In contrast,

Applicant uses a 3-bit, 0-1-2 ternary encoding scheme for both image writing and reading.

Another distinction between Applicant's invention and the disclosure by Fleming et

al is: Fleming et al. uses fluorene dyes that are exposed to light to store data; in contrast,

Applicant uses fluorene dyes to read data in a fluorescent based readout.

A further distinction between Applicant's invention and the disclosure by Fleming et

al. is the use of a photoreactive species including monomers, oligomers, and cross-linkable

polymers wherein light is used to create polymeric material or cross-linked material with

holographic elements; in contrast, Applicant uses a transparent polymeric material and DOES

NOT initiate polymerization reactions or the like. There is nothing in Applicant's

combination of a transparent polymeric material impregnated with a photoacid generator and

a reactive fluorene dye that would undergo polymerization.

Fleming et al. teach a distinctly different technology and use of fluorene compounds

and photo-acid generators. Applicant uses a photo-acid generator that undergoes two-photon

absorption, generating a super acid (or proton ion); the acid then reacts with the fluorene

derivative to change the optical properties of the medium for storage. In contrast, Fleming et

al use fluorene derivatives as a photosensitizer to make another photoreactive material (e.g., monomer, oligomer, and the like) more sensitive to two-photon absorption. Applicant DOES NOT use fluorene dye as a photosensitizer.

Applicant does use fluorene compounds in the readout of stored data by exciting the fluorene derivatives and detecting the changes in optical properties of the medium; but the fluorene derivatives are not undergoing any photochemical reactions. They are simply there for the readout.

Thus, Fleming et al is teaching a technology related to holographic data storage and preparation of complex, three-dimensional objects, while Applicant is teaching a chemical process yielding image formation for compact disc (CD) and Digital Video Disc (DVD) and related technology using a photosensitive polymeric film containing a photo-acid generator and an acid-sensitive reactive dye (fluorophore), which allows two-photon induced, dual-channel fluorescence imaging.

Applicant's amendments to Claims 1, 3 and 18 – 19 require that the ternary coding scheme be for 3-bit data storage and readout which would exclude 2-bit data, such as holographic data. Further, the amended claims now identify the following: the transparent polymer of the data storage medium, the tunable laser, the wavelengths for recording and reading data, the two fluorescent wavelengths (650 and 530) needed to collect ternary data, the laser light initiated reaction of the photoacid generator and the class of reactive dye. Having added these limitations to clarify the scope of Applicant's invention; the disclosure of Fleming et al. (teaching 2-bit, 0-1 holographic data formation) does not begin to suggest or teach or motivate one skilled in the art to increase the storage of data by 50% on a CD or

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DVD using a 3-bit, 0-1-2 ternary encoding scheme and using the same chemical components in the readout of the stored data.

In view of the arguments and amendments to claims, Applicant respectfully requests the withdrawal of the rejection of Claims 1, 3 and 18-19 under 35 U.S.C. 103(a) as being fully anticipated by Fleming et al. WO 01/96959.

On page 6 of the Office Action of July 09, 2008, paragraph 5, Claims 1-5, 7-12 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Devoe et al. WO 01/96952 and Marder et al. '913.

The Examiner argues that, "Marder et al. '913 teaches the use of binders in two photon absorbing compositions... use of polymerization processes is disclosed... use of compositions in writing three dimensional media is taught.... It would have been obvious to modify the cited example of Devoe et al.... by using other laser wavelengths... in place of 800 nm used in the invention with a reasonable expectation of forming the desired images with an increased sensitivity based upon ... two photon absorption... taught by Marder et al. '913."

Applicant's amended claims more precisely claim the invention. Applicant does not form colored patterns or images in a multicolor printing process described by Devoe et al; nor is there anything in Applicant's combination of materials that would undergo polymerization, as in Marder et al. In contrast, Applicant's invention increases the data storage capacity in a data storage medium (CD or DVD), by at least 50%, using a 3-bit, 0-1-2 ternary encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating

fluorescent values in a transparent polymer impregnated with a reactive dye (fluorophore) and a photo-acid generator.

Thus, the Examiner has combined two references that use two-photon absorbers, but neither reference stores data on a transparent polymeric medium (CD or DVD); neither reference uses 3-bit, 0-1-2 ternary encoding scheme to increase the data storage and there is no teaching, suggestion or motivation to use a transparent polymeric material impregnated with a photoacid generator and a reactive fluorene dye to achieve the data storage and readout results claimed by Applicant.

In *In re Rouffet*, 47 USPQ 2d 1453, at 1457-1458 (Fed. Cir. 1998), the Court said "[t]o prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness. In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed."

Applicant has used a chemical process that yields image formation within a photosensitive polymeric film impregnated with a photoacid generator and an acid-sensitive reactive fluorene dye, which allows two-photon induced, dual-channel fluorescence data storage and readout using a 3-bit, 0-1-2 ternary coding scheme increasing data storage on CDs and DVDs.

In view of the arguments and amendments to claims, Applicant respectfully requests the withdrawal of the rejection of Claims 1, 3 and 18-19 under 35 U.S.C. 103(a) as being unpatentable over Devoe et al. WO 01/96952 and Marder et al. '913.

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In paragraph 6 on page 7 of the Office Action of July 09, 2008, Claims 1 – 5, 7-12, and 15-19 are rejected under 35 U.S. C. 103(a) as being unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153 and Rentzepis et al. '610.

Applicant respectfully requests the withdrawal of the rejection of canceled Claims 5, 7, 9, 15 – 17 under 35 U.S. C. 103(a) as being unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153 and Rentzepis et al. '610 because the rejection is now moot.

Applicant maintains the arguments above regarding the patentability of the subject invention over Devoe et al. teaching the formation of colored patterns or images in a multicolor printing process and the combination of similar materials by Marder et al that undergo polymerization, in writing three dimensional media. The common-thread between Devoe et al. and Marder et al is the use of two-photon absorption processes. In contrast, Applicant's invention use two-photon absorption to increase data storage capacity in a data storage medium (CD or DVD), by at least 50%, using a 3-bit, 0-1-2 ternary encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating fluorescent values in a transparent pre-formed polymeric material impregnated with a reactive dye (fluorophore) and a photo-acid generator.

The Examiner argues that, "it would be obvious to" discover Applicant's invention by reading the teachings of Devoe et al. (multicolor printing) in view of Marder et al. (using a two-photon absorber to sensitize various reactions, including polymerization and writing in three dimensional media) and Goodman et al. (using two-photon excitation to cure a polyurethane adhesive and initiate polymerization) and Rentzepis et al. (polymerizing a

monomer containing dyes using acid generating species and two photon recording to form a cube or "useful three-dimensionally imaged article").

Applicant maintains the arguments stated above with regard to overcoming the rejections in paragraph 6 on page 7 of the Office Action of July 09, 2008.

Applicant's amended claims make it clear that Applicant does not form colored patterns or images in a multicolor printing process described by Devoe et al; nor is there anything in Applicant's combination of materials that would undergo polymerization, as in Marder et al. The additional references Goodman et al. '153 and Rentzepis et al. '610 do not cure the invalid rejection.

Goodman et al. '153 forms 2 and 3 dimensional objects or structure by two-photon absorbed photo-polymerization and/or crosslinking of a precursor composition unlike Applicant's use of two-photon absorption for storage and fluorescent read out of data on CDs and DVDs using 3-bit, 0-1-2 ternary encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating fluorescent values in a transparent pre-formed polymeric material impregnated with a reactive dye (fluorophore) and a photo-acid generator.

Applicant acknowledges the work of Rentzepis et al '610 using spiropyran, in the background discussion of the present invention. Applicant notes and distinguishes the present invention as using a chemical process yielding image formation of a stable and long-term nature, in contrast to Rentzepis et al. '610 use of materials known to undergo photobleaching and photodegradation on prolonged exposure, hence not suitable for long term use. (See page 2, lines 19-25 of the subject disclosure.)

The Examiner's argument that "It would have been obvious to form a medium with a binder/matrix which includes color forming materials ...as... taught by Devoe et al. ... based upon the use of similar composition by Goodman et al..., Marder...which uses a binder...and the cited text of Rentzepis et al '610... with a reasonable expectation of forming a useful three dimensionally imaged article... and ...modify the process/articles as three dimensional recording media... use fluorene compounds as the two photon absorbers...taught by Devoe et al and Marder et al." misses the essence of Applicant's invention. Applicant is not forming a "three dimensionally imaged article" as alleged by the Examiner. Applicant teaches and claims an invention that increases the data storage capacity in a data storage medium (CD or DVD), by at least 50%, using a 3-bit, 0-1-2 ternary encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating fluorescent values in a transparent polymer impregnated with a reactive dye (fluorophore) and a photo-acid generator.

Thus, Applicant respectfully requests the withdrawal of the rejection of pending Claims 1 – 4, 6, 8, 10-14, and 18-22 under 35 U.S. C. 103(a) as being unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153 and Rentzepis et al. '610.

Paragraph 7 on page 9 of the Office Action of July 09, 2008 states the rejection of Claims 1 – 22 under 35 U.S.C. 103 (a) as being unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153 and Rentzepis et al. '610, further in view of Glushko et al. '671 and Fourkas et al. '063.

The Examiner now combines SIX references and argues that "It would have been obvious to one skilled in the art to modify the two layer embodiment … of… Devoe et al.…form the media rendered obvious by the combination of Devoe et al.…with Marder et al…Goodman et al…and Rentzepis et al '610… by adding other layers of 100 or more with spacers based …on the teachings of Glushko et al.'671 and Fourkas et al…as each layer will increase the information density of the medium."

Glushko et al. teaches the formation of fluorescent multilayered optical recording media using a binary coding scheme. (See column 3, lines 35-41.) In contrast, Applicant uses two-photon absorption to increase data storage capacity in a data storage medium (CD or DVD), by at least 50% with a **3-bit, 0-1-2 ternary** encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating fluorescent values in a transparent polymer impregnated with a reactive dye (fluorophore) and a photo-acid generator.

Fourkas et al. teaches the variation in the power and duration to control the data bit size in *glassy materials* and do not teach the use of a **3-bit, 0-1-2 ternary** encoding scheme as taught and claimed by Applicant.

Thus, the combination of references cited by the Examiner do not suggest, teach or motivate one skilled in the art to increase data storage capacity in a CD or DVD by using a 3-bit, 0-1-2 ternary encoding scheme, wherein both image writing and reading are accomplished via near-IR two-photon excitation creating fluorescent values in a transparent polymer impregnated with a reactive fluorene dye and a photo-acid generator.

Applicant respectfully requests the withdrawal of the rejection of canceled Claims 5, 7, 9, 15 – 17 under 35 U. S. C. 103(a) as being unpatentable over Devoe et al. WO 01/96952,

in view of Marder et al. '913, Goodman et al. '153 and Rentzepis et al. '610, further in view of Glushko et al. '671 and Fourkas et al. '063 because the rejection is now moot due to cancellation of the enumerated claims.

Further, in view of amendments to claims and arguments presented above, Applicant respectfully requests the withdrawal of the rejection of pending Claims 1 – 4, 6, 8, 10-14, and 18-22 under 35 U.S. C. 103(a) as being unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153 and Rentzepis et al. '610, further in view of Glushko et al. '671 and Fourkas et al. '063.

In paragraph 8 on page 9 of the Office Action of July 09, 2008, Claims 1 – 22 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153, Rentzepis et al. '610, Glushko et al. '671 and Fourkas et al. '063, further in view of Rentzepis et al. '031 and Tanaka et al. "Rapid sub-diffraction limit laser micro/nano processing in a threshold material system", _Appl. Phys. Lett.,_ Vol. 80 (2) pp. 312-314 (01/2002).

The Examiner has now combined EIGHT references to reject Applicant's claims.

Due to cancellation, Applicant respectfully requests the withdrawal of the rejection of Claims 5, 7, 9, 15 – 17 as unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153, Rentzepis et al. '610, Glushko et al. '671 and Fourkas et al. '063, further in view of Rentzepis et al. '031 and Tanaka et al. "Rapid sub-diffraction limit laser micro/nano processing in a threshold material system", _Appl. Phys. Lett.,_ Vol. 80 (2) pp. 312-314 (01/2002), because the rejection is now moot.

Applicant maintains the previous arguments with regard to the inapplicability of the teachings of Devoe et al. (multicolor printing using dyes); Marder (two-photon absorber to

sensitize various reactions, including polymerization and writing in three dimensional media);

Goodman et al. (using two-photon excitation to cure a polyurethane adhesive and initiate

polymerization); Rentzepis et al. '610 (polymerizing a monomer containing dyes using acid

generating species and two photon recording to form a cube or "useful three-dimensionally

imaged article"); Glushko et al. (formation of fluorescent multilayered optical recording

media using a binary coding scheme); Fourkas et al.(variation in the power and duration to

control the data bit size in *glassy materials*).

     Now the Examiner argues that "Rentzepis et al. '031 (a divisional application of

Rentzepis et al. '610) teach 100 planes of data…data layers with an equal thickness of

material…" and "Tanaka et al. …teaches the formation of submicron features … using two

photon excitation processes with Ti:sapphire operating at 780 nm and 150 fs pulse width."

     One must look at the entire teaching of Rentzepis et al. '031 and Tanaka et al.

Rentzepis et al. '031 teaches the use of **binary data recording** (column 7, lines 14-15;

column 12, lines 12-28) in multilayers; in contrast, Applicant teaches multilayer optical data

storage using a **3-bit, 0-1-2 ternary** encoding scheme. Tanaka et al. teaches two-photon

absorption **photopolymerization** using Ti:sapphire laser operating at 780 nm and 150 fs

pulse width.   Applicant has nothing in the disclosed composition that would undergo

polymerization; Applicant's polymeric material is preformed.

     To reiterate, Applicant uses two-photon absorption to increase data storage capacity

in a data storage medium (CD or DVD), by at least 50%, using a 3-bit, 0-1-2 ternary

encoding scheme rather than a 2-bit, 0-1 binary encoding scheme, wherein both image

writing and reading are accomplished via near-IR two-photon excitation creating fluorescent

values in a transparent pre-formed polymeric material impregnated with a reactive fluorene

dye (fluorophore) and a photo-acid generator. Applicant's invention is not suggested or in anyway made obvious by the references cited by the Examiner because none of the references suggest increasing data storage capacity in a CD or DVD, using a 3-bit, ternary encoding scheme, wherein both image writing and reading are accomplished via near-IR two photon excitation creating fluorescent values in a transparent pre-formed polymeric material, such as PMMA or polycarbonate impregnated with a reactive fluorine dye and a photo-acid generator.

Applicant respectfully requests the withdrawal of the rejection of pending Claims 1 – 4, 6, 8, 10-14, and 18-22 under 35 U.S. C. 103(a) as being unpatentable over Devoe et al. WO 01/96952, in view of Marder et al. '913, Goodman et al. '153, Rentzepis et al. '610, Glushko et al. '671 and Fourkas et al. '063, further in view of Rentzepis et al. '031 and Tanaka et al. "Rapid sub-diffraction limit laser micro/nano processing in a threshold material system," *Appl. Phys. Lett.*, Vol. 80 (2) pp. 312-314 (01/2002).

Paragraph 9 on page 11 of the Office Action of July 09, 2008 discusses the judicially created doctrine of nonstatutory double patenting which is then applied in the rejections set forth by the Examiner in Paragraphs 10, 11, 12 and 13.

In paragraphs 11 and 12, it is noted that the rejection are based on co-pending Application numbers wherein the discussion of each rejection is juxtaposed, such that the rejection in paragraph 11 is discussed in paragraph 12 and the rejection in paragraph 12 is discussed in paragraph 11. Applicant will respond as if the rejection and discussion are presented in sequential order.

In paragraph 10 on page 11 of the Office Action of July 09, 2008, Claims 3-22 are rejected on the ground of nonstatutory obviousness-type double patenting as being

unpatentable over claims 1-4 of U.S. Patent No. 7,001,708, in view of Glushko, et al. and Fourkas, et al.'063.

The Examiner argues that "it would have been obvious to one skilled in the art to [modify] the invention of claims 1-4 of U.S. Patent No. 7,001,708 by forming multiple recording layers … [up to 100 layers] … with spacers based upon the teach[ings] of Glushko et al.'671 and Fourkas et al. as each layer will increase the information density of the medium with a reasonable expectation of success."

Applicant disagrees. In *In re Nomiya,* 184 USPQ 607 (CCPA, 1975), the court holds, "There must be a reason apparent at the time the invention was made to the person of ordinary skill in the art for applying the teaching at hand, or use of the teaching as evidence of obviousness will entail prohibited hindsight."

It was unexpected that instead of using a binary encoding scheme as taught in Belfield's U.S. Patent '708, Applicant could use a ternary encoding scheme and increase the data storage capacity by 50%. The use of a ternary encoding scheme is not taught, suggested or discussed by Belfield '708, Glushko et al. '671 or Fourkas et al.

Although Applicant does not agree with the Examiner's rejection for the reasons stated above, in the interest of advancing the prosecution of the present application, Applicant files herewith a terminal disclaimer in compliance with 37CFR 1.321 (c) of 1.321 (d) to overcome the rejection based on nonstatutory double patenting of commonly owned U.S. Patent 7,001,708 to Belfield *(Attachment A)*. Accordingly, Applicant respectfully requests the withdrawal of the rejection of Claims 3-22 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4 of U.S. Patent No. 7,001,708, in view of Glushko, et al. and Fourkas, et al.

In paragraph 11 on page 12 of the Office Action of July 09, 2008, Claims 1-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 and 17-21 of copending Application No. 11/256552, in view of [*Proc. SPIE*], vol. 4459 pp. 281-289 (01/2002) or the corresponding presentation (July 2001), in view of Glushko, et al. and Fourkas, et al. '063.

Applicant notes that the Examiner states "this is a <u>provisional</u> obviousness-type double patenting rejection. Applicant reiterates arguments given above and stresses that it was unexpected that instead of using a 2-bit, binary encoding scheme as taught in Belfield's co-pending Application No. 11/256552, Applicant uses a 3-bit, ternary encoding scheme and increases the data storage capacity by 50%. The use of a 3-bit, ternary encoding scheme is not taught, suggested or discussed in Application No. 11/256552, *Proc. SPIE*, vol. 4459 pp. 281-289 (01/2002) or the corresponding presentation (July 2001), Glushko et al. '671 or Fourkas et al. '063.

To expedite the processing of the present invention however, Applicant files herewith a terminal disclaimer in compliance with 37CFR 1.321 (c) or 1.321 (d) to overcome the rejection based on provisional nonstatutory double patenting of commonly owned co-pending Application No. 11/256552 to Belfield *(Attachment B)*.

Applicant respectfully requests the withdrawal of the rejection of Claims 3-22 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 and 17-21 of copending Application No. 11/256552, *Proc. SPIE* vol. 4459 pp. 281-289 (01/2002) or the corresponding presentation (July 2001), in view of Glushko, et al. '671 and Fourkas, et al. '063.

In paragraph 12 on page 12 of the Office Action of July 09, 2008, Claims 3-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 and 17-21 of co-pending Application No. 11/272189, in view of Glushko, et al. '671 and Fourkas, et al. '063.

The Examiner argues, "It would have been obvious to one skilled in the art to the invention of claims 6 and 30 of co-pending Application No. 11/256552 by forming multiple recording layers of to 100 or more with spacers based on the teach[ings] of Glushko et al. '671 and Fourkas et al. as each layer will increase the information density of the medium with a reasonable expectation of success."

Applicant respectfully disagrees. Applicant reiterates that it was unexpected that instead of using a 2-bit, binary encoding scheme as taught in Belfield's co-pending Application No. 11/272189, Applicant could use a 3-bit, ternary encoding scheme and increase the data storage capacity by 50%. The use of a 3-bit, ternary encoding scheme is not taught, suggested or discussed in commonly owned co-pending Application No. 11/272189, Glushko et al. '671 or Fourkas et al. '063.

However, in the interest of advancing the prosecution of the present applicant, Applicant files herewith a terminal disclaimer in compliance with 37CFR 1.321 (c) or 1.321 (d) to overcome the rejection based on provisional nonstatutory double patenting of commonly owned co-pending Application No. 11/272189 to Belfield *(Attachment C)*.

Applicant respectfully requests the withdrawal of the rejection of Claims 3-22 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 and 17-21 of co-pending Application No. 11/272189, in view of Glushko, et al. '671 and Fourkas, et al. '063.

In paragraph 13 on page 13 of the Office Action of July 09, 2008, Claims 3-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 29-30 of copending Application No. 11/707553, in view of Glushko, et al. '671 and Fourkas, et al. '063.

The Examiner makes the same argument that it would have been obvious to form multiple recording layers based on the teachings in the cited art. The invention is not solely based on multiple layers of material for recording and reading data; but on a novel method that uses a chemical process to record and store data using a 3-bit, ternary coding scheme to increase data storage capacity by 50% over that of a 2-bit binary encoding scheme, with subsequent two-photon fluorescent readout of the stored data.

The use of Applicant's 3-bit, ternary encoding scheme instead of a 2-bit, binary encoding scheme to increase optical data storage by 50% is not taught, suggested or discussed by Belfield in copending Application No. 11/707553, Glushko et al. '671 or Fourkas et al. '063.

Again, in the interest of advancing the prosecution of the present application, Applicant files herewith a terminal disclaimer in compliance with 37CFR 1.321 (c) or 1.321 (d) to overcome the rejection based on provisional nonstatutory double patenting of commonly owned co-pending Application No. 11/707553 to Belfield *(Attachment D)*.
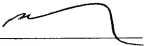
Applicant respectfully requests the withdrawal of the rejection of Claims 3-22 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 29-30 of copending Application No. 11/707553, in view of Glushko, et al. '671 and Fourkas, et al. '063.

In view of Applicant's arguments, amendments to claims, and enclosed terminal disclaimers, the application and pending Claims 1 – 4, 6, 8, 10-14, and 18-22 are believed in condition for allowance; allowance is respectfully requested.

If the Examiner believes that an interview would be helpful, the Examiner is requested to contact the attorney at the below listed number.

Respectfully submitted,

Date: _10/8/08_

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